

## CLAIMS:

1. A method for producing fast forward and backward preview of video, the method comprising:
  - processing incoming frames so as to derive successive representative frames whose content is representative of successive video segments, and
  - displaying said successive representative frames at a rate that achieves a desired acceleration factor.
2. The method according to Claim 1, including displaying the representative frames for a period of time that is sufficiently long to avoid blinking.
3. The method according to Claim 1, wherein a small number of incoming frames are buffered, and said method further comprises:
  - determining for the current frame in said small number of incoming frames whether there exists a frame  $F_R$  that represents the content of a segment surrounding the current frame,
  - if so, accepting the frame  $F_R$  as a representative frame for the said segment, displaying  $F_R$  as a new representative frame, and proceeding to the next incoming frame which becomes a new current frame;
  - if not, proceeding to the next incoming frame which becomes a new current frame and continuing the displaying the current representative frame, selected in an earlier iteration or during initialization.
4. The method according to Claim 1, wherein a small number of incoming frames are buffered, and said method further comprises:
  - proceeding to the next incoming frame which becomes a new current frame and continuing the displaying the current representative frame, selected in an earlier iteration or during initialization.
5. The method according to Claim 3, including:

receiving a sequence of video frames  $F(1), F(2), \dots, F(i), \dots$ ;  
 for a current frame  $F(i)$ , storing a subset  $S$  of frames  $F(j(1)), F(j(2)), \dots, F(j(n))$  preceding the current frame or a representation thereof;  
 determining whether the frame  $F(i)$  is similar to all the frames in said  
 5 subset  $F(j(1)), F(j(2)), \dots, F(j(n))$ ;  
 if so, updating the set  $S$  of frames, appending the current frame  $F(i)$  to said  
 current video segment, and proceeding to the next frame  $F(i+1)$  which becomes the  
 new current frame;  
 if not, accepting a frame  $F(i-1)$  preceding the current frame  $F(i)$  as the  
 10 representative frame  $F_R$  for said current video segment and appending successive  
 frames  $F(i), F(i+1), F(i+2) \dots$ , to the current video segment until the content of one  
 of said successive frames  $F(i+k)$  is no longer adequately represented by the  
 representative frame  $F_R$ ; and  
 commencing a new video segment with said one of said successive frames  
 15  $F(i+k)$ .

6. The method according to Claim 5, wherein the frames in said subset  
 $F(j(1)), F(j(2)), \dots, F(j(n))$  are sequential.

20 7. The method according to Claim 5, wherein the frames in said subset  
 $F(j(1)), F(j(2)), \dots, F(j(n))$  include frames that are non-sequential.

8. The method according to Claim 4, including:  
 25 receiving a sequence of video frames  $F(1), F(2), \dots, F(i), \dots$ ;  
 for a current frame  $F(i)$ , storing a subset  $S$  of frames  $F(j(1)), F(j(2)), \dots, F(j(n))$  preceding the current frame or a representation thereof;  
 determining whether the frame  $F(i)$  is similar to all the frames in said  
 subset  $F(j(1)), F(j(2)), \dots, F(j(n))$ ;

if so, updating the set S of frames, appending the current frame F(i) to said current video segment, and proceeding to the next frame F(i+1) which becomes the new current frame;

if not, accepting a frame F(i-1) preceding the current frame F(i) as the  
5 representative frame F<sub>R</sub> for said current video segment and appending successive frames F(i), F(i+1), F(i+2) ..., to the current video segment until the content of one of said successive frames F(i+k) is no longer adequately represented by the representative frame F<sub>R</sub>; and

commencing a new video segment with said one of said successive frames  
10 F(i+k).

**9.** The method according to Claim 8, wherein the frames in said subset F(j(1)), F(j(2)), ..., F(j(n)) are sequential.

15 **10.** The method according to Claim 8, wherein the frames in said subset F(j(1)), F(j(2)), ..., F(j(n)) include frames that are non-sequential.

**11.** An apparatus for selecting R-Frames for display in a video streaming or  
20 buffered video system, so as to produce fast forward and backward preview in an incoming sequence of video frames, said apparatus comprising:

a buffer memory for storing a small number of frames from an incoming video data stream,

a segment processor coupled to the buffer memory for comparing  
25 successive current frames with the small number of frames in the buffer memory and for appending each current frame to a current segment if a content of the current segment is represented by a content of the respective current frame and for otherwise commencing a new segment with the current frame, and

a representative frame processor coupled to the segment processor for determining for each segment a respective representative frame  $F_R$  that represents a content of the segment.

5    **12.**    The apparatus according to Claim 11 further including:

          a display driver coupled to the representative frame processor for displaying selected R-Frames.

10   **13.**    A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for producing fast forward and backward preview of video, the method comprising:

          processing incoming frames so as to derive successive representative frames whose content is representative of successive video segments, and

15           displaying said successive representative frames at a rate that achieves a desired acceleration factor.

20   **14.**    A computer program product comprising a computer useable medium having computer readable program code embodied therein for producing fast forward and backward preview of video, the computer program product comprising:

          computer readable program code for causing the computer to process incoming frames so as to derive successive representative frames whose content is representative of successive video segments, and

25           computer readable program code for causing the computer to display said successive representative frames at a rate that achieves a desired acceleration factor.

15   **15.**    A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for

- producing fast forward and backward preview of video for which a small number of incoming frames are buffered, the method comprising:
- determining whether each incoming frame may be associated with a current segment;
  - 5 if so, appending the incoming frame to said segment, otherwise commencing a new segment with the incoming frame;
  - determining a respective representative frame for each segment; and
  - displaying the representative frames.
- 10 **16.** A computer program product comprising a computer useable medium having computer readable program code embodied therein for producing fast forward and backward preview of video for which a small number of incoming frames are buffered, the computer program product comprising:
- computer readable program code for causing the computer to determine
  - 15 whether each incoming frame may be associated with a current segment;
  - computer readable program code for causing the computer to append the incoming frame to said segment if it may be associated with a current segment, and for otherwise commencing a new segment with the incoming frame;
  - computer readable program code for causing the computer to determine a
  - 20 respective representative frame for each segment; and
  - computer readable program code for causing the computer to display the representative frames.